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COMPARISON OF COMPUTER OUTPUT MEDIA. 1. COMPUTER PRINTER. 2. XE--ETC(U)
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COMPARISON OF COMPUTER OUTPUT MEDIA.

1. Computer Printer.
2. Xerox Computer Forms Printer (CFP).
3. Xerox 1200 Computer Printing System.
4. IBM 3800 Printing Subsystem.
5. Computer Output Microfiche (COM).

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VERNON M./CRAWFORD

DATA AUTOMATION BRANCH/ACDAC
McCLELLAN AFB, CALIFORNIA

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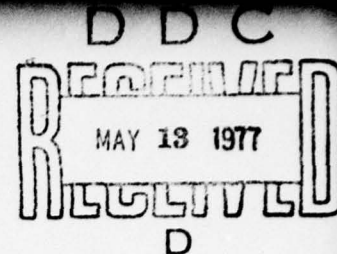
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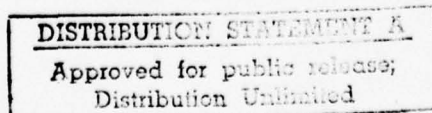
This report is a comparison of various methods of automating the output function of a typical, high volume, commercial automatic data processing facility. The study and subsequent report were prompted by the necessity of reducing both personnel and supply cost in the production of data products. Comparisons were first made between production of data products on microfiche and on paper. Then, under the assumption that not all products are suitable for production on microfiche, a comparison of several automatic paper output media systems was made. The systems were the ZEROX 1200, ZEROX Computer Forms Printer, and the IBM 3800 printer system coupled with an IBM 370/135 mainframe.

Users of this report should carefully compare our production volume and production methodology to their own before accepting our economic analysis. Consideration should also be given to such things as paper cost, microfiche cost, paper storage cost, operator salaries and user satisfaction before determining which system is the most economic and effective to be used.

I believe the systems and techniques discussed in this report, and others that are sure to follow, will prolong the use of paper as a media for computer output. Users still prefer their computer product printed on paper.

I wish to thank the support given by Mr. John B. Moon and Mr. Douglas G. Treuting of ZEROX Corporation, San Francisco, and Mr. Frank W. Gagliano of IBM, Sacramento, who made every effort to verify the accuracy of the figures as it applies to their equipment. I also wish to thank Mr. Vern M. Crawford, who did an excellent job in preparing this report.

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ABSTRACT

This study involves costs associated with the production of computer products and compares the cost of present computer printers to the cost of using the XEROX Computer Forms Printer (CFP), XEROX 1200 Computer Printing System, IBM 3800 Printing Subsystem or Computer Output Microfiche (COM). The study is twofold. It first considers the cost of processing all multipart paper products on each of the alternate systems. The second consideration is a 40% conversion of these products to microfiche with the remaining products being processed on either the XEROX CFP, IBM 3800 or XEROX 1200. The anticipated 40% conversion to microfiche is based on studies in private industry and has been reviewed by Mr. Steve Long, Federal Electric Corp., at Vandenberg AFB, who has been involved in computer-output-microfiche production for some time. Single part paper products were not considered for conversion in this report since we feel that some computer printouts will still be required from the standpoint of convenience, and because the savings involved are minimal. Also, computer printers will still be required for certain special forms even though the XEROX and IBM equipment does have a forms overlay capability.

LIST OF ATTACHMENTS

1. Total Conversion Outline.
2. 40% Conversion to microfiche outline.
3. Computations for present method.
4. Computations for total conversion to XEROX CFP.
5. Computations for total conversion to XEROX 1200.
6. Computations for total conversion to IBM 3800.
7. Computations for total conversion to microfiche.
8. Computations for printed products after 40% conversion.
9. Computations for XEROX CFP products after 40% conversion.
10. Computations for XEROX 1200 products after 40% conversion.
11. Computations for IBM 3800 products after 40% conversion.
12. Computations for 40% conversion to microfiche.
13. References.
14. Wall Street Journal article, 29 October 1975.

INTRODUCTION

During the past several years, there has been an increasing demand for computer generated information and reports necessary to the decision-making process, control of workload and for the accounting of assets. Although the data processing capabilities to process this information is generally sufficient, computer output printing has not kept pace. In addition to the printing itself, many manhours are expended in the finishing operation to remove carbon paper, bursting the continuous computer paper into separate pages, and binding before a product reaches the user. The end product is bulky, requires special files or must be left out on desk tops or open shelves which is unsightly. They are difficult to maintain in a usable condition unless special binders are used and expensive to mail. Also, copies are normally limited to a maximum of 6, the last copies are often difficult to read, and products of 7 or more copies require a second pass on the computer printer. During FY74, a shortage of computer tabulating paper with an increase in price of up to 100% was experienced. Although prices decreased in FY75, an article in the Wall Street Journal, 29 Oct 1975, indicated that an increase in paper prices of at least 10% is expected during the current year. In view of the paper shortage, Headquarters Air Force Logistics Command (AFLC) has directed a reduction in the use of computer paper. One of the methods suggested was the conversion to microfiche. However, we must recognize that all paper products are not adaptable to microm-ation, and a alternate solution is necessary.

In February 1976, Warner Robins Air Logistics Center (WR-ALC), recognizing the need for an alternate output system, installed XEROX CFP's as a result of a study conducted at that ALC. Because of the interest generated by this equipment, AFLC directed a similar study by the remaining ALC's. In conducting this study, Sacramento Air Logistics Center (SM-ALC) found that the XEROX 1200 Computer Printing System was also available under certain conditions, which will be discussed below. The XEROX 1200 is a relative new system and equipment of this type is not available from any other known source. In addition, the SM-ALC study includes the IBM 3800 Printing Subsystem which is also a relative new printing system that, until a recent announcement, could only be used with a full scale IBM 370/145, or higher, computer system. IBM now offers a central processing unit (3135-H) for the purpose of driving a "stand alone" IBM 3800 printing system.

This study is based on SM-ALC's current paper usage which averages 6,858,485 printed pages per month or 82,301,820 pages annually. All standard Air Force Data Systems and AFLC Logistics Data Systems are processed on IBM 7080/1401/360-40, CDC CYBER 70, and Burroughs B3500 computer systems, most of which are operated 21 shifts per week.

This study involves costs associated with the production of computer products and compares the cost of present computer printers to the cost of using the XEROX Computer Forms Printer (CFP), XEROX

1200 Computer Printing System, IBM 3800 Printing Subsystem or Computer Output Microfiche (COM). The study is twofold. It first considers the cost of processing all multipart paper products on each of the alternate systems. The second consideration is a 40% conversion of these products to microfiche with the remaining products being processed on either the XEROX CFP IBM 3800 or XEROX 1200. The anticipated 40% conversion to microfiche is based on studies in private industry and has been reviewed by Mr. Steve Long, Federal Electric Corp., at Vandenberg AFB, who has been involved in computer-output-microfiche production for some time. Single part paper products were not considered for conversion in this report since we feel that some computer printouts will still be required from the standpoint of convenience, and because the savings involved are minimal. Also, computer printers will still be required for certain special forms even though the XEROX and IBM equipment does have a forms overlay capability.

COMPUTER PRINTER

Produces 11" X 14" size Data products plus a variety of special form sizes. The output is continuous form, containing carbon paper which must be removed prior to bursting and distribution. The rated speed (IBM 1401) is 600 lines per minute or 720 original pages per hour.

A maximum of 4320 pages per hour is produced when using 6 part paper.

Special forms must be stocked which complicates the warehousing and ordering process.

Multiple passes on the printer are required when more than 6 copies are required. The carbon copies are often difficult to read, and easily smudged.

The larger sized products are difficult to store and expensive to mail.

Must be operated in a controlled environment.

XEROX Computer Forms Printer (CFP)

The CFP is an off-line computer printout copier that automatically reproduces multiple copies from computer prepared single part paper. Output copies are reduced in size to 8 1/2" x 11" at a rate of 2400 copies per hour using either pre-drilled or non-drilled paper. A 10 bin sorter is standard which allows for automatic sorting of up to 10 copies into collated sets, ready for immediate distribution. Up to 2 additional 10 bin sorters may be added if desired. The rated speed of CFP is 2400 pages per hour (2).

The CFP has a forms overlay capability which would reduce the number of special forms that are now required. The savings that could result from this feature was not considered in this study since each product involving special forms must be reviewed individually.

Any desired number of copies can be printed without multiple passes on the computer. Every copy is an original which is clean, smudge proof and easy to read.

Use of standard paper instead of multipart computer paper simplifies the warehousing and ordering process. Paper storage space and cost of mailing is reduced. For example, a box of single part paper containing 3500 pages weighs 46 pounds, and costs \$26.74 to mail. An equal product on reduced size paper weighs 28 pounds, and costs \$16.66 to mail.

The CFP may be operated in a normal office environment without extensive temperature and humidity controls. XEROX specifications are (2):

Temperature Range - 60°F - 90°F

Humidity Range - 15%RH - 65%RH

The CFP is readily available and there are no restrictions to its installation.

The primary disadvantage to the CFP is the rate of throughput. A report must first be printed on a computer printer on single part paper. The single part report is then used to produce the desired number of copies. A box of 6 part paper contains 500 sets, or 2500 carbon pages. The processing time to remove the carbon, book and distribute a product this size is approximately 35 minutes. At the rate of 2400 copies per hour, the CFP processing time for 2500 pages would be in excess of one hour.

XEROX 1200 Computer Printing System

The 1200 is a complete computer printing system that combines the Xerographic process and digital technology. It is controlled by a mini-computer which accepts information from a normal print formatted magnetic tape and prints on plain 8 1/2" x 11" paper. It has all the advantages of the CFP, plus it eliminates the need for a computer prepared hard copy.

The rated speed of the 1200 is 4,000 lines per minute, (3) or 3600 pages per hour, which is approximately 5 times faster than the IBM 1401 printing system when printing single copy reports. This means more timely products printed on reduced size paper for improved usability.

A controlled environment is required due to the mini-computer and tape drive. XEROX specifications are (3):

Recommended operating temperature - $72^{\circ}\text{F} \pm 4^{\circ}\text{F}$.

Minimum/Maximum temperature - 60°F to 90°F .

Minimum/Maximum relative humidity - 30% to 60%.

There are two restrictions to the installation of the 1200.

a. All geographical areas are not "open" to this system and a minimum order of 5 machines, preferably at one location, is required before an area may be "opened".

b. The tape drive will only accept a 9-track tape at the present time. However, XEROX plans to have a 7 track tape drives available soon.

IBM 3800 PRINTING SUBSYSTEM

The IBM 3800 Printing Subsystem is a general purpose printer that uses an electrophotographic technique with a low-powered laser to print on a variety of page sizes. A standard size computer product can be reduced

in size to 8 1/2" x 11" (5). The reduced size was chosen for this study to take advantage of the savings in paper cost and mailing cost. The 3800 uses continuous pin fed paper, and with the optional Burster-Trimmed-Stacker, the output product can be burst, both edges trimmed and stacked with each complete copy offset to allow for ready identification of copies. The rated speed for producing 8 1/2" x 11" products is 12,900 pages per hour regardless of the number of lines per page (5).

A forms overlay feature is available which allows the use of blank paper rather than pre-printed forms. This study does not consider this feature since each form must be reviewed individually, but future savings could be realized through its use.

The equipment configuration used in this study includes a card reader and a card punch, eliminating the card-to-tape and punch-out functions in the IBM 7080/1401 area. An IBM 1403 printer may also be added, if desired, to allow printing of special forms and for some back-up capability.

Mailing of an IBM 3800 reduced size product would cost the same as a XEROX product, or \$16.60 for 3500 pages and compared to \$26.74 to mail a standard size product.

The 3800 is a computer system and must be operated in a controlled computer environment. IBM specifications are (5):

Recommended operating temperature	75°F \pm 2°F.
Recommended relative humidity	50% \pm 5%.

Minimum/maximum temperature	60°F to 90°F.
Minimum/maximum relative humidity	20% to 80%.

There are no known restrictions to the installation of the IBM 3800.

A disadvantage to the installation of one printing system to displace many of our current computer printers is that only limited back-up would be available in the event of down-time, and a prolonged period of down-time could be detrimental to the output operation.

No attempt was made in this study to determine the cost of conversion to any of the alternate printing systems. However, it appears that conversion to the 3800 could be a little more costly than the other printing systems.

MICROFICHE (DATAGRAPHIX 4550 COM RECORDER)

The COM recorder is a complete computer output system which accepts information from a print formatted magnetic tape, translates that information into human readable form and records it onto film. It is controlled by a mini-computer which also develops the "eye-ball" readable visual header and may also extract information from the data stream for the index frame. The output is a sheet of film approximately 4" x 6" (105mm x 148.75mm)

which contains up to 269 frames (or pages) of data plus the 1 index frame when recorded at a reduction ratio of 48x. The rated speed of the Data Graphix is 24,222 pages per hour.

The processing steps to produce microfiche products and their rated speeds are as follows:

Recorder	21,800 lines per minute
Film processor	7 feet or 21 fiche or 355,887 lines per minute
Duplicator	13 fiche copies or 320,311 lines per minute

The fiche duplicator used at SM-ALC is a Datagraphix 76 that collates each product into individual sets which are ready for immediate distribution. Considering the above operating speeds, microfiche processing offers a tremendous reduction in processing time and labor cost.

Storage space required for microfiche is less than 2% that of computer paper. A box of computer paper containing 3500 pages requires approximately 2 cubic feet to store. The same amount of data on microfiche would require 14 fiche or approximately .013608 cubic foot, without envelopes.

The cost of mailing microfiche products is drastically lower than the cost of mailing paper products. A microfiche product which is equal to the box of computer paper costing \$26.74 to mail and the XEROX product costing \$16.60 to mail, would require 14 fiche weighing 3.5 ounces costing \$.46 to mail first class.

In spite of the many advantages of microfiche, there is some reluctance to use it. The primary factors which restricts the acceptance of microfiche products are the normal reluctance to change, a viewer must be used to read it, and you cannot write on it. In some cases, the necessity to write on a product is a valid reason for non-acceptance. However, many times a viewer/printer may be used to produce only those pages requiring annotations at an approximate cost of 10 cents per page. It is now possible to keep reports and documents at your finger tips indefinitely because of the compactness of microfiche. The automatic generation of the visual header and index provides for access to any page in one minute or less. Private industry studies (6) indicates that approximately four minutes are required to retrieve information in a paper product.

Microfiche viewers and viewer/printers are available through Defense Supply Agency (DSA) at approximate costs of \$124.00 for a viewer and \$1,000.00 for a viewer/printer. The product users are normally responsible for ordering and funding their viewer requirements. One 1,000 page report with 6 copies, or a total of 24 fiche would provide enough savings to pay for one microfiche viewer.

ANALYSIS

The annual savings that would be possible from total conversion to each system are as follows:

	<u>CFP</u>	<u>1200</u>	<u>3800</u>	<u>FICHE</u>
PRESENT COST	\$1,164,752.	\$1,164,752.	\$1,164,752.	\$1,164,752.
PROPOSED COST	<u>1,081,576.</u>	<u>996,658.</u>	<u>891,358.</u>	<u>397,404.</u>
SAVINGS	\$ 83,176.	\$ 168,094.	\$ 273,394.	\$ 767,348.

The annual savings that would be possible from microfiche conversion of 40% of our current multipart workload and the remainder being produced on a paper system are as follows:

	<u>COMPUTER</u>			
	<u>PRINTERS</u>	<u>CFP</u>	<u>1200</u>	<u>3800</u>
PROPOSED MICROFICHE COST	\$ 146,604.	\$146,604.	\$146,604.	\$146,604.
HARDCOPY SYSTEM COST	<u>713,501.</u>	<u>671,572.</u>	<u>618,826.</u>	<u>652,048.</u>
TOTAL	860,105.	818,176.	765,430.	798,652.
PRESENT COST	<u>1,164,752.</u>	<u>1,164,752.</u>	<u>1,164,752.</u>	<u>1,164,752.</u>
SAVINGS	\$ 304,647.	\$ 346,576.	\$ 399,322.	\$ 366,100.

The proposed cost of microfiche production is combined with each paper system cost, then compared to the present cost to determine the overall savings

CONCLUSION

This study points out that total conversion of multipart paper products to microfiche will provide the greatest savings. However, only an estimated 40% of these products are adaptable to micromation, but we should not overlook the tremendous savings that it offers. The combination of microfiche and the XEROX 1200 is the most economical when considering the use of a paper system. Five XEROX 1200's would be required to process SM-ALC's remaining paper workload. To emphasize the advantage of microfiche conversion, partial conversion to microfiche with the remaining workload on computer printers is more economical than total conversion to either alternate paper system.

RECOMMENDATION

There should be a continued emphasis on conversion to microfiche.

Since the combination of microfiche and the XEROX 1200's will result in the most savings for a paper system, recommend installation as soon as XEROX can offer 7 and 9 track tape drives. The 5 machines required at SM-ALC is sufficient to "open" the entire Sacramento area and installation may be in increments as long as XEROX has a firm commitment for the 5 machines. Incremental installation will allow for gradual preparation of job parameters which will make for a more orderly conversion.

Selection of the CFP will require a careful analysis of turnaround requirements to determine whether or not schedules can be met. We would only recommend their installation if an area could not be "opened" to the 1200 and if current schedules could be maintained. The potential savings is less, but still substantial.

TOTAL CONVERSION

	<u>PRESENT METHOD</u>	<u>XEROX CFP</u>	<u>XEROX 1200</u>	<u>IBM 3800</u>	<u>MICROFICHE</u>
<u>MATERIALS</u>					
MULTIPART PAPER	\$ 48,271.	\$	\$	\$	
SINGLE PART PAPER		8,733.			
SUPPLIES					
(Paper, Toner, Developer and Fuser Oil)		20,471.	27,893.	28,600.	
PAPER WASTAGE	4,827.	873.			
PRINTER RIBBONS	1,579.	1,579.			
<u>EQUIP & MAINT</u>					
COMPUTER PRINTER (Multipart)	18,017.				
COMPUTER PRINTERS (Single Part)		14,293.			
IBM 1401 CARD TO TAPE & PUNCHOUTS	2,226.	2,226.	2,226.		2,226.
LEASE OF ALTERNATE EQUIP		23,313	43,891	36,041.	
DECOLLATOR MAINT	25.				
<u>PERSONNEL</u>					
COMPUTER OPERATORS (Multipart)	12,085.				
COMPUTER OPERATORS (Single Part)		9,459.			
IBM 1401 CARD TO TAPE & PUNCHOUTS	797.	797.	797.	797.	797.
DECOLLATING & DISTRIBUTION	7,606.	7,348.	7,404.	8,180.	893.
MATERIAL HANDLING	1,059.	720.	657.	1,228.	
<u>SERVICES</u>					
<u>MICROFICHE PRODUCTION</u>					
TOTAL MONTHLY COST	96,492.	89,812.	82,868.	74,049.	29,201.
	x 12	x 12	x 12	x 12	
ANNUAL COST	1,157,904.	1,077,744.	994,416.	888,588.	33,117.
<u>STORAGE SPACE (ANNUAL)</u>	6,848.	3,832.	2,242.	2,770.	397,404.
					0.
TOTAL ANNUAL COST	\$1,164,752.	\$1,081,576.	\$ 996,658.	\$ 891,358.	\$ 397,404.

AFTER 40% CONVERSION TO MICROFICHE

	COMPUTER PRINTERS	XEROX CFP	XEROX 1200	IBM 3800	MICROFICHE
<u>MATERIALS</u>					
MULTIPART PAPER	28,963.	5,235.			
SINGLE PART PAPER					
SUPPLIES					
(Paper, Toner, Developer and Fuser Oil)			16,736.	17,160.	
PAPER WASTAGE	2,897.	12,283.			
PRINTER RIBBONS	948.	524.			
		948.			
<u>EQUIP & MAINT</u>					
COMPUTER PRINTER (Multipart)	10,810.				
COMPUTER PRINTER (Single part)		8,576.			
IBM 1401 CARD TO TAPE & PUNCHOUTS	2,226.	2,226.			
LEASE OF ALTERNATE EQUIP		13,755.	25,695.	30,707.	
DECOLLATOR MAINT	25.				
<u>PERSONNEL</u>					
COMPUTER OPERATORS (Multipart)	7,251.				
COMPUTER OPERATORS (Single part)		5,676.			
IBM 1401 CARD TO TYPE & PUNCHOUTS	797.	797.	797.		
DECOLLATING & DISTRIBUTION	4,564.	5,150.	5,520.	5,479.	536.
MATERIAL HANDLING	635.	551.	424.	773.	
<u>SERVICES</u>					
MICROFICHE PRODUCTION					11,681.
TOTAL MONTHLY COST	59,116.	55,721.	51,398.	54,119.	12,217.
	x 12	x 12	x 12	x 12	x 12
ANNUAL COST	709,392.	668,652.	616,776	649,428.	146,604.
STORAGE SPACE (ANNUAL)	4,109.	2,920.	2,050.	2,620.	0.
TOTAL ANNUAL COST	713,501.	671,572.	618,826.	652,048.	146,604.

PRESENT METHOD

1. PAPER USAGE

<u>PARTS</u>	<u>AVG BOXES</u>	<u>SETS PER BOX</u>	<u>TOTAL SETS</u>	<u>COPIES PER SET</u>	<u>TOTAL COPIES</u>	<u>TOTAL PAGES</u>
1	199.	3500	696,500			696,500
2	333.5	1400	466,900	1	466,900	933,800
3	401.5	1000	401,500	2	803,000	1,204,500
4	643.7	700	450,590	3	1,351,770	1,802,360
5	229.7	650	149,305	4	597,220	746,525
6	682.7	500	341,350	5	1,706,750	2,048,100
8	38.5	400	15,400	7	107,800	123,200
TOTAL	2528.6		2,521,545		5,033,440	7,554,985
LESS ONE PART			696,500			696,500
TOTAL MULTIPART			1,825,045			6,858,485

2. COMPUTER PRINTER UTILIZATION

<u>MACH TYPE</u>	<u>AVG USE</u>	<u>TOTAL HOURS</u>	<u>PERCENT OF UTILIZATION</u>
301	839	4611	.18
360/40	1037	4611	.22
1401	1245	4611	.27
B3500	300	4611	.07
CDC	1190	4611	.26
TOTAL	4611		1.00

3. PRINTER HOURS - MULTIPART PAPER

<u>MACH TYPE</u>	<u>TOTAL SETS</u>	<u>PERCENT OF UTILIZATION</u>	<u>PRORATED VOLUME</u>
301	1,825,045	x	328,508
360/40	1,825,045	x	401,510
1401	1,825,045	x	492,762
B3500	1,825,045	x	127,753
CDC	1,825,045	x	474,512
TOTAL			1,825,045

301 Workload being converted to B3500 and CYBER 70 computers. Approximate breakout is 10% to B3500 and 90% to CYBER 70.

328,508	301 PRORATED VOLUME
<u>.10</u>	
32,851	INCREASED B3500 WORKLOAD
295,657	INCREASED CYBER 70 WORKLOAD

<u>MACH TYPE</u>	<u>PRORATED VOLUME</u>	<u>INCREASED WORKLOAD</u>	<u>TOTAL</u>	<u>AVG PRINTER SPEED</u>	<u>PRINTER HOURS</u>
360/40	401,510		401,510 +	1100	365
1401	492,762		492,762 +	650	758
B3500	127,753	32,851	160,604 +	800	201
CDC	474,512	295,657	770,169 +	1200	<u>642</u>
TOTAL					1966

4. PRINTER HOURS - SINGLE PART

<u>MACH TYPE</u>	<u>TOTAL SETS</u>	<u>PERCENT OF UTILIZATION</u>	<u>PRORATED VOLUME</u>
301	696,500	.18	125,370
360/40	696,500	.22	153,230
1401	696,500	.27	188,055
B3500	696,500	.07	48,755
CDC	696,500	.26	<u>181,090</u>
TOTAL			696,500

301 Workload being converted to B3500 and CYBER 70 computers. Approximate breakout is 10% to B3500 and 90% to CYBER 70.

125,370	301 PRORATED VOLUME
<u>.10</u>	
12,537	INCREASED B3500 WORKLOAD
112,833	INCREASED CYBER 70 WORKLOAD

<u>MACH TYPE</u>	<u>PRORATED VOLUME</u>	<u>INCREASED WORKLOAD</u>	<u>TOTAL</u>	<u>AVG PRINTER SPEED</u>	<u>PRINTER HOURS</u>
360/40	153,230		153,230	1100	139
1401	188,055		188,055	650	289
B3500	48,755	12,537	61,292	800	77
CDC	181,090	112,833	293,923	1200	<u>245</u>
TOTAL					750

5. MULTIPART PAPER COST

<u>PART</u>	<u>AVG BOXES</u>	<u>COST PER BOX</u>	<u>TOTAL COST</u>
2	333.5	\$ 22.82	\$ 7,610.47
3	401.5	17.52	7,034.28
4	643.7	17.55	11,296.94
5	229.7	24.36	5,595.49
6	682.7	22.82	15,579.21
8	38.5	30.00	<u>1,155.00</u>
			\$48,271.39

6. SINGLE PART PAPER COST

<u>AVG BOXES</u>	<u>COST PER BOX</u>	<u>TOTAL COST</u>
199	\$16.73	\$3,329.27

7. PAPER WASTAGE

MULTIPART PAPER COST	\$48,271.39
*PERCENT OF WASTAGE	<u>.10</u>
	\$ 4,827.14

* Based on a study conducted by Warner Robins ALC (1).

8. PRINTER RIBBONS

<u>TYPE</u>	<u>MULTIPART PRINTER HOURS</u>		<u>AVERAGE PRINTER USE</u>	<u>PERCENT USED FOR MULTIPART PRINTING</u>
IBM	1123	+	2282	.49
BURROUGHS	160	+	300	.53
CDC	395	+	1190	.33

<u>TYPE</u>	<u>TOTAL MO. RIBBON USAGE</u>		<u>MULTIPART PERCENT</u>	<u>MULTIPART USAGE</u>	<u>INCREASED WORKLOAD</u>
IBM	190	x	.45	86	
BURROUGHS	21	x	.53	11	3
CDC	18	x	.33	6	4

INCREASED WORKLOAD VOLUME TO B3500 AND CDC DUE TO CONVERSION OF RCA 301

DATA SYSTEMS ARE AS FOLLOWS:

B3500 - .26

CDC - .62

<u>TYPE</u>	<u>MULTIPART USAGE</u>	<u>UNIT COST</u>	<u>TOTAL COST</u>
IBM	86	\$13.20	\$1,135.20
BURROUGHS	14	18.30	256.20
CDC	10	18.80	188.00

TOTAL \$1,579.40

9. PRINTER COST - MULTIPART PAPER

<u>MACH TYPE</u>	<u>PRINTER HOURS</u>	<u>PRINTER COST PER HOUR</u>	<u>MONTHLY PRINTER COST</u>
360/40	365	\$ 1.09	\$ 397.85
1401	758	21.00	15,918.00
B3500	201	1.79	359.79
CDC	642	2.09	1,341.78

TOTAL \$18,017.42

10. PRINTER COST - SINGLE PART

<u>MACH TYPE</u>	<u>PRINTER HOURS</u>	<u>PRINTER COST PER HOUR</u>	<u>MONTHLY PRINTER COST</u>
360/40	139	\$ 1.09	\$ 151.51
1401	289	21.00	6,069.00
B3500	77	1.79	137.83
CDC	245	2.09	<u>512.05</u>
TOTAL			\$6,870.39

11. IBM 1401 CARD-TO-TAPE AND PUNCH OUTS

ESTIMATED 1401 CARD VOLUME	69 CASES
PUNCHING TIME PER CASE	<u>.67</u>
TOTAL PUNCHING HOURS	46.23

ESTIMATED 1401 CARD-TO-TAPE HOURS	2 PER DAY
DAYS PER MONTH	<u>30</u>
TOTAL CARD-TO-TAPE HOURS	60

106 X \$21.00	=	\$ 2,226.00	MACHINE COST PER MONTH
106 X \$ 7.52	=	797.12	OPERATOR COST PER MONTH

12. COMPUTER OPERATOR SALARY - MULTIPART PAPER

<u>MACH TYPE</u>	<u>MACH HOURS</u>		<u>PERCENT OF OPERATOR STAFFING</u>	<u>OPERATOR HOURS</u>
360/40	365	x	33	120
1401	758	x	100	758
B3500	201	x	75	151
CDC	642	x	90	<u>578</u>
TOTAL				1607
SALARY PER HOUR				\$ <u>7.52</u>
TOTAL OPERATOR SALARY				\$12,084.64

13. COMPUTER OPERATOR SALARY - SINGLE PART PAPER

<u>MACH TYPE</u>	<u>MACH HOURS</u>		<u>PERCENT OF OPERATOR STAFFING</u>	<u>OPERATOR HOURS</u>
360/40	139	x	33	46
1401	289	x	100	289
B3500	77	x	75	58
CDC	245	x	90	221
TOTAL				614
SALARY PER HOUR				\$ 7.52
TOTAL OPERATOR SALARY				\$4,617.28

14. DECOLLATING AND DISTRIBUTION

<u>AVG BOXES</u>	<u>HRS PER BOX</u>	<u>TOTAL HOURS</u>	<u>SALARY PER HOUR</u>	<u>TOTAL SALARY</u>
2529	.583	1474	\$5.16	\$7,606.00

15. MATERIAL HANDLING

178 HRS PER MONTH @ \$5.33	\$ 948.74
20 HRS PER MONTH @ 5.49	109.80
TOTAL	\$1,058.54

16. STORAGE SPACE

	<u>SQ FT</u>	<u>ANNUAL SQ FT COST</u>	<u>TOTAL COST</u>	<u>PALETS</u>
BLDG 264	2090	\$ 1.60	\$3,344.00	56
BLDG 263C	629	4.00	2,516.00	16
BLDG 262	118	4.00	472.00	5
BLDG 269C	129	4.00	516.00	6
TOTAL	2966	\$13.60	\$6,848.00	83

TOTAL CONVERSION TO XEROX CFP

1. XEROX CFP PAGE VOLUME AND NUMBER OF MACHINES REQUIRED

TOTAL COPIES, MULTIPART PAPER ONLY	5,033,440
ESTIMATED MONTHLY PRODUCTION PER MACH	450,000

$$\frac{5,033,440}{450,000} = 11.2 \text{ or } 11 \text{ MACHINES}$$

2. SINGLE PART PAPER REQUIREMENT AND COST

TOTAL MULTIPART SETS	1,825,045
SETS PER BOX OF SINGLE PART PAPER	3,500

$$\frac{1,825,045}{3,500} = 521.4 \times \$16.75 = \$8,733.45$$

3. CFP SUPPLIES COST

AVERAGE COST PER COPY FOR PAPER, TONER, DEVELOPER AND FUSER OIL - \$.00415.*

5,033,440 x \$.00415 =	\$20,888.78
LESS 2% PROMPT PMT DISCOUNT	<u>417.78</u>

TOTAL	\$20,471.00
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* Supply cost computed using Nashua Paper (non-Drilled) @ \$1.52 per ream, GSA price.

4. PAPER WASTAGE

TOTAL SINGLE PART PAPER COST	\$ 8,733.45
*PERCENT OF WASTAGE	<u>.10</u>

873.35

* Based on a study conducted by Warner Robins ALC (1).

5. PRINTER RIBBONS

<u>TYPE</u>	<u>MULTIPART PRINTER HOURS</u>		<u>AVERAGE PRINTER USE</u>	<u>PERCENT USED FOR MULTIPART PRINTING</u>
IBM	1123	+	2282	.49
BURROUGHS	160	+	300	.53
CDC	395	+	1190	.33

<u>TYPE</u>	<u>TOTAL MO. RIBBON USAGE</u>		<u>MULTIPART PERCENT</u>	<u>MULTIPART USAGE</u>	<u>INCREASED WORKLOAD</u>
IBM	190	x	.45	86	
BURROUGHS	21	x	.53	11	3
CDC	18	x	.33	6	4

INCREASED WORKLOAD VOLUME TO B3500 AND CDC DUE TO CONVERSION OF RCA 301

DATA SYSTEMS IS AS FOLLOWS:

B3500 - .26

CDC - .62

<u>TYPE</u>	<u>MULTIPART USAGE</u>	<u>UNIT COST</u>	<u>TOTAL COST</u>
IBM	86	\$13.20	\$1,135.20
BURROUGHS	14	18.30	256.20
CDC	10	18.80	<u>188.00</u>
TOTAL			\$1,579.40

6. PRINTER COST, SINGLE PART PAPER ONLY

PRESENT PRINTER COST, MULTIPART PAPER	\$18,017.42
LESS EXCESS PAPER LOADING COST	<u>3,723.93</u>

TOTAL	\$14,293.49
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<u>MACH</u> <u>TYPE</u>	<u>AVERAGE</u> <u>PAPER CHANGES</u>	<u>TIME</u> <u>PER CHANGE</u>	<u>TOTAL</u> <u>HOURS</u>	<u>HOURLY</u> <u>COST</u>	<u>MONTHLY</u> <u>COST</u>
360/40	690	3 MIN	34.5	\$ 1.09	\$ 37.61
1401	3240	3 MIN	162	21.00	3,402.00
B3500	2307	3 MIN	115.4	1.79	206.57
CDC	2230	1 MIN	<u>37.2</u>	2.09	<u>77.75</u>
TOTAL			349.1		\$3,723.93

7. IBM 1401 CARD-TO-TAPE AND PUNCH OUTS

SAME AS ITEM 11.

8. CFP EQUIPMENT COST

GSA CONTRACT GS-005-34437 (PLAN E) (4)

BASIC MACHINE RENTAL (11 MACHINES)	\$14,900.00
(INCLUDES 2,750,000 COPIES)	
COPIES OVER 2,750,000 (2,283,440 @ \$.004)	<u>9,133.76</u>
TOTAL	\$24,033.76
LESS 3% PROMPT PMT DISCOUNT	<u>721.01</u>
TOTAL	\$23,312.75

9. COMPUTER OPERATOR COST, SINGLE PART PAPER ONLY

PRESENT OPERATOR COST, MULTIPART PAPER	\$12,084.64
LESS EXCESS PAPER LOADING COST	<u>2,625.23</u>
TOTAL	\$ 9,459.41
EXCESS PAPER LOADING HOURS	349.1
SALARY PER HOUR	<u>\$ 7.52</u>
TOTAL OPERATOR SALARY	\$ 2,625.23

10. DECOLLATING AND DISTRIBUTION

CFP PAGE VOLUME	5,033,440
CFP RATED SPEED	2,400 COPIES PER HOUR
NUMBER OF MACHINES REQUIRED	11
2,400 x 11 = 26,400 TOTAL COPIES PER HOUR	
<u>5,033,440</u>	
26,400 = 191 MACHINE HOURS	
MACHINE HOURS	191
OPERATORS REQUIRED	<u>6</u>
EQUIPMENT OPERATOR HOURS	1146
DISTRIBUTION HOURS	<u>278</u>
TOTAL MANPOWER HOURS	1424
HOURLY SALARY	<u>\$ 5.16</u>
TOTAL COST	\$ 7,347.84

11. MATERIAL HANDLING

XEROX PAPER REQUIRED	<u>5,033,440</u>	
	5,000	= 1007 BOXES
SINGLE PART PAPER REQUIRED	<u>721</u>	
TOTAL BOXES		1728

<u>PAPER REQUIRED</u>	<u>PRESENT REQUIREMENT</u>	<u>PERCENT OF PRESENT WORKLOAD</u>		<u>PRESENT COST</u>	<u>PROPOSED COST</u>
1728	2529	.68	x	\$1,059.	\$720.

12. STORAGE SPACE

		ANNUAL		
		SQ FT	TOTAL	
		<u>SQ FT</u>	<u>COST</u>	<u>PALETS</u>
BLDG	264	990	\$ 1.60	23
BLDG	263C	315	4.00	7
BLDG	262	118	4.00	5
BLDG	269C	<u>129</u>	<u>4.00</u>	<u>6</u>
TOTAL		1552	\$13.60	41

TOTAL CONVERSION TO XEROX 1200

1. XEROX 1200 PAGE VOLUME AND NUMBER OF MACHINES REQUIRED

TOTAL MULTIPART PAGES	6,858,485
ESTIMATED MONTHLY PRODUCTION PER MONTH	800,000

$$\frac{6,858,485}{800,000} = 8.6 \text{ or } 9 \text{ MACHINES}$$

2. 1200 SUPPLIES COST

AVERAGE COST PER COPY FOR PAPER, TONER, DEVELOPER AND FUSER OIL \$.00415.*

6,858,485 x \$.00415	\$28,462.71
LESS 2% PROMPT PMT DISCOUNT	<u>569.25</u>
TOTAL	\$27,893.46

* Supply cost computed using Nashua Paper (non-drilled) @ \$1.52 per ream, GSA price.

3. IBM 1401 CARD-TO-TAPE AND PUNCH OUTS

SAME AS ITEM 11.

4. 1200 EQUIPMENT COST

MONTHLY USE CHARGE \$1600. x 9	\$14,400.00
PAGE CHARGE 6,858,485 x \$.0043	<u>29,491.49</u>
TOTAL	\$43,891.49

5. DECOLLATING AND DISTRIBUTION

1200 PAGE VOLUME	6,858,485
1200 RATED SPEED	3,600 PAGES PER HOUR
NUMBER OF MACHINES REQUIRED	9

3600 x 9 32400 TOTAL COPIES PER HOUR

$$\frac{6,858,485}{32400} = 212 \text{ MACHINE HOURS}$$

	PRODUCT FINISHING OPERATOR	LEAD OPERATOR
MACHINE HOURS	212	212
OPERATORS REQUIRED	<u>4</u>	<u>1</u>
EQUIPMENT OPERATOR HOURS	848	212
DISTRIBUTION HOURS	<u>278</u>	<u>0</u>
TOTAL MANPOWER HOURS	1126	212
HOURLY SALARY	\$ <u>5.16</u>	\$ <u>7.52</u>
TOTAL	\$ 5,810.16	\$ 1,594.24
GRAND TOTAL	\$7,404.40	

6. MATERIAL HANDLING

XEROX PAPER REQUIRED	6,858,485	
	5,000	= 1372 BOXES
SINGLE PART PAPER REQUIRED		<u>199</u>
TOTAL		1571 BOXES

PAPER REQ	PRESENT REQUIREMENT	PERCENT OF PRESENT WORKLOAD	PRESENT COST	PROPOSED COST
1571	2529	.62	x \$1,059.	\$656.58

7. STORAGE SPACE

		<u>SQ FT</u>	<u>ANNUAL SQ FT COST</u>	<u>TOTAL COST</u>	<u>PALETS</u>
BLDG	264	1064	\$ 1.60	\$1702.40	31
BLDG	263C	38	4.00	152.00	1
BLDG	262	71	4.00	284.00	3
BLDG	269C	<u>26</u>	<u>4.00</u>	<u>104.00</u>	<u>1</u>
TOTAL		1199	\$13.60	\$2242.40	36

TOTAL CONVERSION TO IBM 3800

1. IBM 3800 PAGE VOLUME AND NUMBER OF MACHINES REQUIRED

TOTAL MULTIPART PAPER	6,858,485
OPERATING SPEED	12,900 PGS PER HOUR

6,858,485
12,900 = 531.6 HOURS PER MONTH

TOTAL AVAILABLE HOURS PER MONTH	720
OPERATIONAL HOURS	<u>532</u>
REMAINING HOURS FOR SET-UP, PREVENTIVE MAINTENANCE, EMERGENCY MAINTENANCE, etc.	188

NOTE: The above does not consider peak worklaod periods and additional equipment may be required to meet scheduled due out times.

2. 3800 SUPPLIES COST

AVERAGE COST PER COPY FOR PAPER, TONER AND DEVELOPER \$.00417.

6,858,485	x	\$.00417.	\$28,599.88
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3. 3800 EQUIPMENT COST

BASIC RENTAL	\$ 23,422.
USE CHARGE	11,174.
EXTRA USE COST	<u>1,445.</u>

TOTAL \$ 36,041.

PAGE VOLUME	6,858,485
PAGE SIZE (INCHES)	8.5
TOTAL INCHES	<u>58,297,122</u>
DIVIDE BY 12 FOR TOTAL FEET	4,858,093.5
COST PER FOOT	<u>\$.0023</u>

TOTAL USE CHARGE \$ 11,173.62

<u>COMPONENT</u>	<u>MODEL OR FEATURE</u>	<u>DESCRIPTION</u>	<u>BASIC LEASE</u>
3800	1	Printing Subsystem	\$6,250
	1490	Burster-Trimmer- Stocker	<u>900</u>
			\$7,150.

\$7,150.

176 = \$40.63 x .10 = \$4.06 Extra Use Charge

OPERATIONAL HOURS	532
BASIC HOURS	<u>176</u>
EXTRA USE HOURS	356
EXTRA USE CHARGE	<u>4.06</u>
EXTRA USE COST	\$1,445.36

4. DECOLLATING AND DISTRIBUTION

3800 PAGE VOLUME	6,858,485
3800 RATED SPEED	12,900 PAGES PER HOUR

6,858,485
12,900 = 532 MACHINE HOURS

	PRODUCT FINISHING OPERATOR	LEAD OPERATOR
MACHINE HOURS	532	532
OPERATORS REQUIRED	<u>1</u>	<u>1</u>
EQUIPMENT OPERATOR HOURS	532	532
DISTRIBUTION HOURS	<u>278</u>	<u>0</u>
TOTAL MANPOWER HOURS	810	532
HOURLY SALARY	\$ <u>5.16</u>	\$ <u>7.52</u>
TOTAL	\$ 4,179.60	\$ 4,000.64
GRAND TOTAL	\$ 8,180.24	

5. MATERIAL HANDLING

IBM PAPER REQUIRED 6,858,485
2,500 = 2743 BOXES

SINGLE PART PAPER REQUIRED 199

TOTAL 2,942 BOXES

<u>PAPER REQ</u>	<u>PRESENT REQUIREMENT</u>	<u>PERCENT OF PRESENT WORKLOAD</u>	<u>PRESENT COST</u>	<u>PROPOSED COST</u>
2942	2529	1.16	\$1,059.	\$1,228.44

6. STORAGE SPACE

	<u>SQ FT</u>	<u>ANNUAL SQ FT COST</u>	<u>TOTAL COST</u>	<u>PALETS</u>
BLDG 264	1394	\$ 1.60	\$2,230.00	41
BLDG 263C	38	4.00	152.00	1
BLDG 262	71	4.00	284.00	3
BLDG 269C	<u>26</u>	<u>4.00</u>	<u>104.00</u>	<u>1</u>
	1529	\$13.60	\$2,770.00	46

TOTAL CONVERSION TO MICROFICHE

1. DECOLLATING AND DISTRIBUTION

173 HOURS PER MONTH @ \$5.16 \$892.68

Required for the control of tapes forwarded for microfiche production and agenda processing.

2. MATERIAL HANDLING

SINGLE PART PAPER REQUIRED 199 BOXES

<u>PAPER REQ</u>	<u>PRESENT REQUIREMENT</u>	<u>PERCENT OF PRESENT WORKLOAD</u>		<u>PRESENT COST</u>	<u>PROPOSED COST</u>
199	2529	.08	x	\$1,059.	\$84.72

3. MICROFICHE PRODUCTION

The unit cost of \$.16 per fiche copy includes equipment charges and all other overhead expenses at SM-ALC's current rate of production, per SM-ALC's Director of Administration. As production increases, unit cost will decrease.

AVERAGE PAGES PER FICHE - 150

The current average number of copies is 9 per fiche. However, indications are that this average will increase as other products are converted and is estimated to be 15 copies per fiche.

$$\frac{1,825,045}{150} = 12,167 \text{ FICHE MASTERS PER MONTH}$$

FICHE MASTERS	12,167
ESTIMATED COPIES	<u>15</u>

TOTAL COPIES	182,505
COST PER COPY	\$ <u>.16</u>

TOTAL PRODUCTION COST	\$ 29,200.80
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4. IBM 1401 CARD-TO-TAPE AND PUNCH OUTS

SAME AS ITEM 11.

5. STORAGE SPACE

	<u>SQ FT</u>	<u>ANNUAL SQ FT COST</u>	<u>TOTAL COST</u>	<u>PALETS</u>
BLDG 264	0	\$ 1.60	\$ 0	0
BLDG 263C	38	4.00	152.00	1
BLDG 262	71	4.00	284.00	3
BLDG 269C	<u>26</u>	<u>4.00</u>	<u>104.00</u>	<u>1</u>
TOTAL	135	\$13.60	\$540.00	5

PLANNED CONVERSION OF 40% OF PRESENT WORKLOAD

1. MULTIPART PAPER COST

PRESENT COST	\$48,271.
PERCENT OF CONVERSION	<u>.40</u>
AMOUNT OF REDUCTION	19,308.40
PLANNED TOTAL COST	\$28,962.60

2. PAPER WASTAGE

PRESENT COST	\$ 4,827.
PERCENT OF CONVERSION	<u>.40</u>
AMOUNT OF REDUCTION	1,930.
PLANNED TOTAL COST	2,897.

3. PRINTER RIBBONS AFTER 40% CONVERSION

PRESENT COST	\$ 1579.40
PERCENT OF CONVERSION	<u>.40</u>
AMOUNT OF REDUCTION	631.76
PLANNED TOTAL COST	\$ 947.64

4. IBM 1401 CARD-TO-TAPE AND PUNCH OUTS

SAME AS ITEM 11.

5. DECOLLATOR MAINT

PRESENT COST \$25.

6. COMPUTER OPERATORS (MULTIPART)

PRESENT COST \$12,084.64
PERCENT OF CONVERSION .40

AMOUNT OF REDUCTION 4,833.86
PLANNED TOTAL COST \$ 7,250.78

7. DECOLLATING & DISTRIBUTION

PRESENT COST \$7,606.
PERCENT OF CONVERSION .40

AMOUNT OF REDUCTION 3,042.40
PLANNED TOTAL COST \$4,563.60

8. MATERIAL HANDLING

PRESENT COST \$1,059.
PERCENT OF CONVERSION .40

AMOUNT OF REDUCTION 423.60
PLANNED TOTAL COST \$ 635.40

9. STORAGE SPACE

PRESENT COST \$6,848.
PERCENT OF CONVERSION .40

AMOUNT OF REDUCTION 2,739.20
PLANNED TOTAL COST \$4,108.80

XEROX CFP AFTER 40% MICROFICHE CONVERSION

1. XEROX CFP PAGE VOLUME

TOTAL COPIES	5,033,440
PERCENT OF CONVERSION	<u>.40</u>
MICROFICHE PAGES	2,013,376
REMAINING PAPER VOLUME	3,020,064

2. NUMBER OF CFP's REQUIRED

ESTIMATED MONTHLY PRODUCTION PER MACH	450,000
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$$\frac{3,020,064}{450,000} = 6.7 \text{ or } 7 \text{ MACHINES}$$

3. SINGLE PART PAPER REQUIREMENT AND COST

MULTIPART PAPER SETS	1,825,045
PERCENT OF CONVERSION	<u>.40</u>

MICROFICHE SETS	730,018
REMAINING PAPER SETS	1,095,027

$$\frac{1,095,027}{3,500} = 312.9 \times \$16.73 \quad \$5,234.82$$

4. IBM 1401 CARD-TO-TAPE AND PUNCH OUTS

SAME AS ITEM 11.

5. CFP SUPPLIES COST

AVERAGE COST PER COPY FOR PAPER, TONER, DEVELOPER AND FUSER OIL \$.00415.*

3,020,064 x \$.00415 =	\$12,533.27
LESS 2% PROMPT PMT DISCOUNT	<u>250.67</u>
TOTAL	12,282.60

* Supply cost computed using Nashua Paper (non-drilled) @ \$1.52 per ream, GSA price.

6. PAPER WASTAGE

TOTAL PAPER COST	\$5,235.00
*PERCENT OF WASTAGE	<u>.10</u>
	523.50

* Based on a study conducted by Warner Robins ALC

7. PRINTER RIBBONS

PRESENT COST	\$ 1579.40
PERCENT OF CONVERSION	<u>.40</u>
AMOUNT OF REDUCTION	631.76
PLANNED TOTAL COST	\$ 947.64

8. COMPUTER PRINTER COST

PRINTER COST (MULTIPART) AFTER 40% CONV	\$10,810.45
LESS EXCESS PAPER LOADING COST AFTER 40% CONV	<u>2,234.36</u>
TOTAL	\$ 8,576.09

9. CFP EQUIPMENT COST

GSA CONTRACT GS-005-34437 (PLAN E)

BASIC MACHINE RENTAL (7 MACHINES)	\$ 9,100.00
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(INCLUDES 1,7500,000 COPIES)

COPIES OVER 1,750,000 (1,270,064 @ \$.004)	<u>5,080.26</u>
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LESS 3% PROMPT PMT DISCOUNT	<u>14,180.26</u> <u>425.41</u>
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TOTAL	\$13,754.85
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10. COMPUTER OPERATOR COST

PRESENT OPERATOR COST (MULTIPART) AFTER 40% CONV	\$7,250.78
LESS EXCESS PAPER LOADING COST AFTER 40% CONV	<u>1,575.14</u>
TOTAL	\$5,675.64

11. DECOLLATING AND DISTRIBUTION

CFP PAGE VOLUME	3,020,064
CFP RATED SPEED	2,400 PAGES PER HOUR
NUMBER OF MACHINES REQUIRED	7

2400 x 7 = 16,800 TOTAL COPIES PER HOUR

3,020,064
16,800 = 180 MACHINE HOURS

MACHINE HOURS	180
OPERATORS REQUIRED	4
EQUIPMENT OPERATOR HOURS	720
DISTRIBUTION HOURS	278
TOTAL MANPOWER HOURS	998
HOURLY SALARY	\$ 5.16
TOTAL COST	\$5,149.68

12. MATERIAL HANDLING

XEROX PAPER REQUIRED 3,020,064
5,000 = 604 BOXES

SINGLE PART PAPER REQUIRED 721

TOTAL BOXES 1325

<u>PAPER REQUIRED</u>	<u>PRESENT REQUIREMENT</u>	<u>PERCENT OF PRESENT WORKLOAD</u>	<u>PRESENT COST</u>	<u>PROPOSED COST</u>
1325	2529	.59	\$1,059.	\$550.68

13. STORAGE SPACE

	<u>SQ FT</u>	<u>ANNUAL SQ FT COST</u>	<u>TOTAL COST</u>	<u>PALETS</u>
BLDG 264	880	\$ 1.60	\$1408.00	14
BLDG 263C	195	4.00	780.00	5
BLDG 262	118	4.00	472.00	5
BLDG 269C	<u>65</u>	<u>4.00</u>	<u>260.00</u>	<u>3</u>
TOTAL	1258	\$13.60	\$2920.00	27

XEROX 1200 AFTER 40% MICROFICHE CONVERSION

1. XEROX 1200 PAGE VOLUME

TOTAL MULTIPART PAGES	6,858,485
PERCENT OF CONVERSION	<u>.40</u>
MICROFICHE PAGES	2,743,394
REMAINING PAPER VOLUME	4,115,091

2. NUMBER OF 1200's REQUIRED

ESTIMATED MONTHLY PRODUCTION PER MACH	800,000
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$$\frac{4,115,091}{800,000} = 5.1 \text{ or } 5 \text{ MACHINES}$$

3. IBM 1401 CARD-TO-TAPE AND PUNCH OUTS

SAME AS ITEM 11.

4. 1200 SUPPLIES COST

AVERAGE COST PER COPY FOR PAPER, TONER, DEVELOPER AND FUSER OIL \$.00415.*

4,115,091 x \$.00415	\$17,077.63
LESS 2% PROMPT PMT DISCOUNT	<u>341.55</u>
TOTAL	\$16,736.08

*Supply cost computed using Nashua paper (non-drilled) @ \$1.52 per ream, GSA price.

5. 1200 EQUIPMENT COST

MONTHLY USE CHARGE	\$1600. x 5	8000.00
PAGE CHARGE	\$4,115,091 x \$.0043	<u>17694.89</u>
TOTAL		25694.89

6. DECOLLATING AND DISTRIBUTION

1200 PAGE VOLUME 4,115,091
 1200 RATED SPEED 3,600 COPIES PER HOUR
 NUMBER OF MACHINES REQUIRED 5

3,600 x 5 18,000 TOTAL COPIES PER HOUR

4,115,091
 18,000 = 229 MACHINE HOURS

	PRODUCT FINISHING OPERATOR	LEAD OPERATOR
MACHINE HOURS	229	229
OPERATORS REQUIRED	2	1
EQUIPMENT OPERATOR HOURS	458	229
DISTRIBUTION HOURS	278	0
TOTAL MANPOWER HOURS	736	229
HOURLY SALARY	\$ 5.16	\$ 7.52
TOTAL	\$3,797.76	\$1,722.08
GRAND TOTAL		\$5,519.84

7. MATERIAL HANDLING

XEROX PAPER REQUIRED 4,115,091
 5,000 = 823 BOXES

SINGLE PART PAPER REQUIRED 199
 TOTAL BOXES 1022

PAPER REQUIRED	PRESENT REQUIREMENT	PERCENT OF PRESENT WORKLOAD	PRESENT COST	PROPOSED COST
1022	2529	.40	\$1,059.	\$423.60

8. STORAGE SPACE

	SQ FT	ANNUAL SQ FT COST	TOTAL COST	PALETS
BLDG 264	944	\$ 1.60	\$1510.40	18
BLDG 263C	38	4.00	152.00	1
BLDG 262	71	4.00	284.00	3
BLDG 269C	26	4.00	104.00	1
TOTAL	1079	\$13.60	\$2050.40	23

IBM 3800 AFTER 40% CONVERSION TO MICROFICHE

1. IBM 3800 PAGE VOLUME

TOTAL MULTIPART PAGES	6,858,485
PERCENT OF CONVERSION	<u>.40</u>
MICROFICHE PAGES	2,743,394
REMAINING PAPER VOLUME	4,115,091

2. NUMBER OF 3800's REQUIRED

OPERATING SPEED	12,900 PAGES PER HOUR
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$$\frac{4,115,091}{12,900} = 318.9 \text{ HOURS PER MONTH}$$

TOTAL AVAILABLE HOURS PER MONTH	720
OPERATIONAL HOURS	<u>319</u>
REMAINING HOURS FOR SET-UP PREVENTIVE MAINTENANCE, EMERGENCY MAINTENANCE, ETC.	401

3. 3800 SUPPLIES COST

AVERAGE COST PER COPY FOR PAPER, TONER AND DEVELOPER	\$.00417.
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$$4,115,091 \times \$.00417 = \$17,159.93$$

4. 3800 EQUIPMENT COST

BASIC RENTAL	\$23,422.
USE CHARGE	6,704.
EXTRA USE COST	<u>581.</u>
TOTAL	30,707.

PAGE VOLUME	4,115,091
PAGE SIZE (INCHES)	<u>8.5</u>
TOTAL INCHES	34,978,273
DIVIDE BY 12 FOR TOTAL FEET	2,914,856
COST PER FOOT	<u>\$.0023</u>
TOTAL USE CHARGE	6,704.17

<u>COMPONENT</u>	<u>MODEL</u> <u>FEATURE</u>	<u>DESCRIPTION</u>	<u>BASIC</u> <u>LEASE</u>
3800	1	PRINTING SUBSYSTEM	\$6,250.
	1490	BURSTER-TRIMMER- STACKER	<u>900.</u>
			\$7,150.

$$\frac{\$7,150}{176} = \$40.63 \times .10 = \$4.06 \text{ EXTRA USE CHARGE}$$

OPERATIONAL HOURS	319
BASIC HOURS	<u>176</u>
EXTRA USE HOURS	<u>143</u>
EXTRA USE CHARGE	<u>4.06</u>
EXTRA USE COST	\$580.58

5. DECOLLATING AND DISTRIBUTION

3800 PAGE VOLUME	4,115,091	
3800 RATED SPEED	12,900	COPIES PER HOUR

$$\frac{4,115,091}{12,900} = 319 \text{ MACHINE HOURS}$$

	<u>PRODUCT FINISHING OPERATOR</u>	<u>LEAD OPERATOR</u>
MACHINE HOURS	319	319
OPERATORS REQUIRED	<u>1</u>	<u>1</u>
EQUIPMENT OPERATOR HOURS	319	319
DISTRIBUTION HOURS	<u>278</u>	<u>0</u>
TOTAL MANPOWER HOURS	597	319
HOURLY SALARY	\$ 5.16	\$ 7.52
TOTAL	\$3,080.52	\$2,398.88

GRAND TOTAL \$5,479.40

6. MATERIAL HANDLING

IBM PAPER REQUIRED	$\frac{4,115,091}{2,500} = 1,646 \text{ BOXES}$
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SINGLE PART PAPER REQUIRED	<u>199</u>
TOTAL	1845 BOXES

<u>PAPER REQ</u>	<u>PRESENT REQUIREMENT</u>	<u>PERCENT OF PRESENT WORKLOAD</u>	<u>PRESENT COST</u>	<u>PROPOSED COST</u>
1845	2529	.73	\$1,059.	\$773.07

7. STORAGE SPACE

	<u>SQ FT</u>	<u>ANNUAL SQ FT COST</u>	<u>TOTAL COST</u>	<u>PALETS</u>
BLDG 264	1300	\$1.60	\$2,080.00	25
BLDG 263C	38	4.00	152.00	1
BLDG 262	71	4.00	284.00	3
BLDG 269C	<u>26</u>	<u>4.00</u>	<u>104.00</u>	<u>1</u>
	1435	\$13.60	\$2,620.00	30

40% CONVERSION TO MICROFICHE

1. DECOLLATING & DISTRIBUTION

COST FOR TOTAL CONVERSION	\$892.68
PERCENT OF PLANNED CONVERSION	<u>.40</u>
AMOUNT OF REDUCTION	357.07
COST FOR MICROFICHE PRODUCTS	\$535.61

2. MICROFICHE PRODUCTION

SEE NOTES, PAGE 35

TOTAL MULTIPART SETS	1,825,045
PERCENT OF CONVERSION	<u>.40</u>
PLANNED MICROFICHE PRODUCTION	730,018

730,018
150 = 4,867 FICHE MASTERS PER MONTH

FICHE MASTERS	4,867
ESTIMATED COPIES	<u>15</u>
TOTAL COPIES	\$ 73,005
COST PER COPY	<u>.16</u>
TOTAL PRODUCTION COST	\$11,680.80

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4. General Services Administration Contract GS-055-34437, contract period 1 July 1975 through 30 June 1976, XEROX Corporation.
5. IBM pamphlet, GC26-3829-2, "Introducing the IBM 3800 Printing Sub-system and its Programming," November 1975.
6. Datagraphix Micromation pamphlet, "What COM is about."

International Paper's Ability to Offset Rises In Costs Is Debated; '76 Profit Estimates Vary

By CHARLES J. ELIA

Like other basic industries, paper producers have experienced weak markets and low operating rates this year. The combination has taken its toll on profits, but product prices have held up surprisingly well.

With the strong upsurge in gross national product in the third quarter, in fact, leading paper companies have been raising prices selectively in recent weeks, rekindling the debate on Wall Street over 1976 profitability prospects.

The debate tends to focus on the outlook for giant International Paper Co. The wide range of profit expectations for 1976 is a sign of how deeply split analysts are over the ability of this company — and others — to keep prices a step ahead of rising costs.

In 1974, International Paper earned \$5.95 a share. This year, Wall Street estimates are in the \$4-to-\$4.75-a-share range, clustering mostly around the \$4.50-a-share level. But for 1976, the estimates are all over the lot. Analysts at the 31 research firms canvassed by the Institutional Brokers Estimate System are carrying estimates as low as \$3.40 a share and as high as \$6 a share. The midpoint estimate in this sample is about \$5 a share.

Some analysts are becoming more convinced that it may take an unlikely combination of economic circumstances to justify some of the loftier 1976 estimates, although some rebound from depressed 1975 profit levels is predictable.

Clients of William D. Witter Inc., for example, received a report this week from analyst John C. Hathaway saying that International Paper's sales volume will have to rise more sharply than he's projecting in 1976 for earnings to rise much more than 15% from his estimate of \$4.50 a share for 1975.

Mr. Hathaway is using a \$5.25 estimate for 1976 and is assuming that "real" gross national product growth will be near the consensus expectation of 6%.

"In order for International Paper to show 1976 earnings in excess of \$5.25 a share, one must assume either a dynamic recovery in physical volume, or aggressive pricing increases or lower-than-consensus cost increases," he says. Mr. Hathaway, in fact, expects favorable comparisons for the company in the first half of 1976 to give way to eroding profit margins in the absence of broad price increases.

He arrives at these conclusions partly

because he considers the outlook for product price aggressiveness so uncertain. A more dynamic volume recovery than the 12% gain he's expecting, he says, would mean operating rates in the industry would have to rise above 90% of capacity. The rate is expected to average 70% to 80% this year.

Recent price increases on linerboard, bleachboard and a few other products have been selective and affect, perhaps, only about 15% of industry product lines, analysts estimate. While many analysts are encouraged by the price boosts, some skepticism remains. Weyerhaeuser, for example, hasn't followed recent moves by Union Camp and others to raise linerboard prices to levels near International Paper's.

Mr. Hathaway estimates cost increases at International Paper next year will range up to 12% on fixed-cost items and 5% to 10% on variable-cost items, and says costs "are clearly a major constraint on a better profits showing than we have assumed." He believes the company's stock will be an "average-to-below-average" market performer over the near term.

Thomas Farrell of Bache & Co. is far more bullish. He's estimating the company will earn \$5 a share this year and \$6 a share next year. Mr. Farrell has traced what he considers a close link between GNP growth and paper production. He, too, is using a 6% GNP growth assumption in 1976 but his conclusion is that "production will be up strongly and we see little difficulty for these companies to raise prices."

He has been recommending purchase of International Paper, as well as Union Camp and St. Regis Paper. "The sharp decline in production this year has created the opportunity for a strong rebound in 1976," he says.

International Paper declined to comment on analysts' estimates. In remarks to Wall Street analysts at a recent meeting, however, Arthur W. Harrigan, executive vice president, finance, termed "the new world of rapidly escalating costs for all industry an even more formidable confrontation for the paper industry," and stressed the company's need "to collect prices from our customers that compensate for this new world of costs."

Glen A. Dell, company treasurer, told analysts the company has been seeing improvement "in many, but not all," of its business lines. Bleachboard demand has been improving, he said, as are sales of corrugated containers, kraft paper products, uncoated white papers and pulp. Demand for lumber, plywood and wood products hasn't yet shown signs of improvement, he added.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This study invoices costs associated with the production of computer products and compares the cost of present computer printers to the cost of using the Xerox Computer Forms Printer (CFP), Xerox 1200 Computer Printing System, IBM 3800 Printing Subsystem or Computer output Microfiche (COM). The study is twofold. It first considers the cost of processing all multipart paper products on each of the alternate systems. The second consideration is a 40% conversion of these products to microfiche with the remaining products being processed on either the Xerox CFP, IBM 3800 or		

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Xerox 1200. The anticipated 40% conversion to microfiche is based on studies in private industry and has been reviewed by Mr Steve Long, Federal Electric Corp, at Vanenberg AFB, who has been involved in computer-output-microfiche production for some time. Single part paper products were not considered for conversion in this report since we feel that some computer printerouts will still be required from the standpoint of convenience, and because the savings involved are minimal. Also, computer printers will still be required for certain special forms even though the Xerox and IBM equipment does have a forms overlay capability.

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